

is presented which conforms to the best modern usage. Homology of parts and a uniform terminology are certainly among the most important contributions of such a work. Fortunately they have been handled in masterful fashion due to the wide experience of the author and his familiarity with the literature. Students would do well to follow the conclusions and terms presented here, thus stabilizing our sadly confused anatomical terminology. Then later, if more exhaustive study shows that our ideas must be changed, uniformity may rightly give way to progress.

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**The Genus *Geocoris* in the Hawaiian Islands**  
(Lygaeidae, Hemiptera)

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(Presented at the meeting of November 7, 1935)

The genus *Geocoris* has not invaded insular areas to any great extent although it occurs in the Philippine Islands and on all mainland areas surrounding the Pacific. Other members of the great subfamily Geocorinae, however, have long been known from islands of Oceania where, in the Marquesas Islands, recent exploration has shown that *Germalus* reaches its peak, no less than seven species having been discovered there. The absence, until recently, of all members of the Geocorinae from the Hawaiian Islands has thus been a very remarkable thing. The first Hawaiian record of one of these "big-eyed bugs" was by Swezey (1936), based upon a specimen of *Geocoris punctipes* (Say) collected by him on *Cynodon dactylon* at Pearl City, Oahu, on Jan. 22, 1935. Two specimens have since been taken by Walter Donaghho on Ewa Coral Plain, Oahu, April 14, 1935 (see Swezey 1936). Recent collections by myself on the islands of Hawaii, Oahu, Manana, and Kauai are recorded in this paper and indicate that the genus has become firmly established here. It thus deserves a share of attention until its status as a beneficial or harmful group may be determined.

GENUS *GEOCORIS* FALLEN, 1814

Short robust species, convex above. Head transverse, more than twice as broad, eyes included, as long; margin between eyes and antenniferous tubercles straight; tylus longitudinally sulcate; eyes scarcely or not at all stylate, extending postero-laterally beyond anterior angles of pronotum; ocelli small, two in number, located on the edge of depressions near the inner border of the eyes; bucculae very small but distinctly elevated. Antennae about as long as head and pronotum together, the first segment shortest and second segment longest. Rostrum attaining posterior coxae, first segment longer than second. Scutellum almost or quite as long as broad. Hemelytra either hyaline or opaque; clavus narrowed apically, scarcely surpassing tip of scutellum, the commissure wanting; corium with two slightly divergent rows of punctures near its inner margin, the row nearest the claval suture often dichotomous, a row at inner margin of embolium, and more or less scattered punctures on disk near apex.

Genotype, *Geocoris grylloides* (Linn.).

The principal literature is by Stål (1874), Distant (1903), Montandon (numerous papers over a period of years), McAtee (1914), and Barber (1935).

*Germalus* differs in the more elgonate form and flattened dorsal surface. The head is more than twice as broad, eyes included, as long; margin between eyes and antenniferous tubercles deeply sinuate; tylus not sulcate; eyes strongly stylate, produced laterally; ocelli located on vertex at margin of pedicels. Antennae considerably longer than head and pronotum together. Scutellum slightly broader than long. Clavus with sides parallel; commissure distinct, over half as long as scutellum. Corium with only three more or less distinct rows of punctures.

Two species of *Geocoris* are now known from our region.

### 1. *Geocoris punctipes* (Say), 1832.

A large, polished species rather uniformly light in color. Head in great part ochraceous or with fuscous to black markings, not at all granulous, with a fine longitudinal sulcus extending from sulcation of tylus onto vertex. A distinct, transverse, arcuate sulcus behind the tylus, not attaining eyes. Antero-lateral angles of pronotum rounded. Basal angles of scutellum with distinct, pale calloused areas. Hemelytra hyaline. Length 4-4.5 mm.

Oahu: Pearl City, I-22-'35, on *Cynodon dactylon*, O. H. Swezey, one specimen; Ewa Coral Plain, IV-14-'35, Walter Donaghho, two specimens; Mt. Olympus, 3,000 ft., X-6-'35, *Ilex sandwicensis*, R. L. Usinger, one specimen; and Manana or Rabbit Island, I-19-'36, R. L. Usinger, twenty-five specimens.

Found commonly throughout the southern and southwestern United States and Mexico and doubtless introduced through commerce from the Pacific Coast as suggested by the early records from the vicinity of Pearl Harbor. On Rabbit Island this species was very common, occurring on all types of vegetation and on the ground mainly beneath *Portulaca*. The shiny, green-gray nymphs are very striking in appearance and were common in all stages.

## 2. *Geocoris pallens* Stål, 1874.

Smaller, the head black, finely granular and beset with a short, sparse, white pubescence. Longitudinal and transverse sulci, except on tylus, obscure or wanting. Antero-lateral margins of pronotum distinctly angulated. Head, in great part, pronotum anteriorly and extending posteriorly behind the callosities, and scutellum at base and longitudinally at middle, black. Hemelytra opaque. Length, 3.5 mm.

Hawaii: Humuula, 6,000 ft., and south slope of Mauna Kea to summit, 13,784 ft., July 30 to August 11, 1935, R. L. Usinger; Mauna Kea, summit, on surface of snow, XII-28-'35, K. P. Chapson. Kauai: Barking Sands, XII-31-'35, R. L. Usinger.

A very common species in the western United States. On Hawaii it was taken commonly while collecting for the Hawaiian Academy of Science Mauna Kea Expedition at all elevations on this highest peak of the Hawaiian group. Here it occurred on the ground at the bases of tufts of grass and beneath stones in grassy fields. At Lake Waiau, 13,007 ft., it was one of the commonest insects, running about everywhere. A pair was taken in copulation on a tuft of grass above Lake Waiau, 13,050 ft. Mr. Chapson's record for midwinter on the surface of the snow where he found the bugs alive is remarkable. The occurrence of the same species at the other end of the Hawaiian Islands on Kauai is further evidence of its general distribution. It was found running about on the sand dunes beneath and about *Ipomoea* and *Vitex* plants in company with ants and a lowland species of *Nysius*.

Economic literature is replete with references on the biology of these insects. Almost without exception the early references condemn the bugs as destructive, often simply on the superficial evidence of their occurrence on a given plant. All recent records throughout the world, however, report them as predacious on eggs, nymphs, or even adults of mites, aphids, plant bugs, leafhoppers,

etc. Likewise the genus *Germalus*, if the action of *pacificus* in Fiji may be taken as typical, should be considered as predacious. H. W. Simmonds has noted it both in literature (1929) and in a recent letter to O. H. Swezey as predacious on the immature stages of the Lantana tingid, *Teleonemia lantanae* Dist., and on the eggs of the fruit fly, *Dacus passiflorae*, although it has also been taken on the berries of Lantana (Simmonds 1928). Many of the observations are so confusing that the evidence concerning the biology of the entire group is certainly not conclusive. It seems safe to conclude that *pallens* is predacious, at least on the top of Mauna Kea, for here there is little or nothing in the way of plant material available whereas there is an abundance of weakened insects which are continually being blown up to these bleak heights to die. Such a situation should offer a veritable paradise to predacious bugs which are able to withstand the adverse climatic conditions.

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